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LIFE AT THE EDGE OF SCIENCE

by Beverly Rubik, PhD

At The Monroe Institute's annual Professional Seminar, held in July of 1993, we were honored to have Beverly Rubik, PhD, as special guest speaker. Dr. Rubik received her PhD in biophysics from the University of California at Berkeley and was a faculty member at San Francisco State University from 1979 to 1988. She has been director of the Center for Frontier Sciences at Temple University since 1988 and is presently a member of the advisory panel of the Office of Alternative Medicine at the National Institutes of Health. A deep interest in the reunion of science and spirit has led to research on consciousness interacting with the physical realm.

*In her presentation to the Professional Membership, Dr. Rubik addressed three frontier science areas under exploration by the Center that challenge the dominant paradigm. These are the mind-matter interrelationship (consciousness research), bioelectromagnetics, and complementary medicine (particularly energy medicine). An overview of the Center's work for the past six years was also given, with a strong focus on the mind-matter realm. This article is condensed, with Dr. Rubik's permission, from "Three Frontier Areas of Science That Challenge the Paradigm" and includes the original references. The complete paper was published by The Center for Frontier Sciences in *Frontier Perspectives*, vol. 3, no. 1 (Fall 1992).*

Life is distinguished by its capacity to move upstream, which we are pleased to see is a sign of vigor and vitality. However, flowing along with the mainstream often prevails in the human domain. Fraught with extraordinary difficulties, working in science outside of the mainstream is rare. Our present systems have deterred unique approaches in science, technology, and medicine.

The pursuit of research in frontier sciences such as bioelectromagnetics, novel medical therapies or diagnostics, new energy technology, consciousness studies—research in any area that challenges the dominant mainstream paradigm—poses unusual hardships for scientists. Expressing interest in these can destroy one's reputation as a serious member of the scientific community, regardless of one's stature. Even if one is willing to risk reputation, obtaining funding for frontier research projects is a serious problem with negligible support from government and most private foundations. Another obstacle is publishing in reputable peer-reviewed journals. Publications in the frontier sciences may bring about unforeseen critical backlash from the scientific community.

Therefore, it is not surprising that ideas that depart from the mainstream have little chance of being recognized in their own time or carried through to fruition. Our present human

institutional systems do not encourage novelty, creativity, and long term evolutionary change. They behave more and more like closed systems. It goes without saying that the evolution of closed systems is the antithesis of life.

History has shown repeatedly that many major discoveries in science, medicine, and technology that have radically changed the world have resulted from seemingly far-fetched ideas or attempts to solve what seemed impossible at that time (Kuhn 1970). The rejection of innovative ideas has been typical and has included such luminaries as Galileo, Kepler, Franklin, Semmelweiss, Bell, and discoveries such as x-rays, the theory of relativity, the existence of atoms, the theory of continental drift, and atomic energy.

The present is no exception: geneticist Barbara McClintock unraveled the mysteries of the transposition of genes; Robert O. Becker pioneered research on the biological effects of low-intensity nonionizing electromagnetic radiation; Linus Pauling researched megadose effects of vitamin C; Peter Duesberg, an expert on retroviruses, has criticized the oncogene hypothesis and the role of HIV in the etiology of AIDS; and Jacques Benveniste has demonstrated that extremely dilute solutions of antibodies produce biological effects incomprehensible from a conventional biochemical view. Many have experienced the existing system's preferred method of dealing with novel discoveries—profound disbelief, and accusations of heresy—and some have been subjected to extraordinary investigations including magicians.

Although science is far from being a complete map of reality, scientism, the dogmatic acceptance of mainstream science as proven knowledge, tends to dominate. It is a self-satisfied dogmatism that cherishes the delusion that our available knowledge is somehow infallible and final. However, this contradicts the very essence of science, in which the most exciting and significant discoveries lead to dramatic changes in world view (Kuhn 1970). Nonetheless, reception of novelty in science is typically analogous to the reaction incurred with foreign tissue in a host: rejection. Industry, which thrives on competition and new ideas, presently does not support much research that would produce genuine innovation. It appears that research and development now take a back seat to marketing. Of course, not all new ideas or discoveries are good enough to bear fruit. However, although they involve higher risk, history has shown repeatedly that the pursuit of novel approaches holds the greatest promise for creative breakthroughs. Investment in high-risk scientific projects is comparable to high-risk investments in a diversified financial investment portfolio: to maximize profits in the long run. Failure to pay attention to new perspectives can be lethal.

The Center for Frontier Sciences at Temple University was established in 1987 out of a recognized need for greater openness to novel approaches in science, medicine, and technology. The Center provides the appropriate setting to help legitimize inquiry into nonmainstream areas and to facilitate communication, net working, education, and information exchange to advance research efforts. Based at a large state university, the Center appears to

be unique. High academic standards with an appropriate level of scientific criticism are maintained in examining anomalous claims. One objective is to create an open forum to air novel ideas.

One of the most difficult tasks in working at the edge of science is to choose promising clear paths. Major changes have been triggered not by isolated experimental findings but by collective evidence. Three broad frontier science areas have been identified by the Center. In each of them evidence that challenges contemporary mainstream science has been accumulating from numerous sources. These areas constitute our main foci. They are consciousness research, bioelectromagnetics, and complementary medicine. All three are testable by standard scientific methods and share a relatedness in the challenges they pose to the dominant paradigm. Thus, they have been singled out as among the most likely to profoundly change our views of the universe, life, and the face of technology.

Consciousness research involves inquiry on the nature of mind and its role in the physical and biological realms. It is a broad multidisciplinary area of inquiry where dramatic new results from many avenues are evident. All of life may be regarded as conscious or cognitive in a rudimentary sense, having the capability of sensing and responding to the smallest environmental changes. In humans, different states of consciousness, beliefs, emotions, and intentionality have been shown to play active roles in bodily functions. Research on multiple personality disorders (MPD) indicates that the patient's physiology shifts measurably with each personality (Putnam 1990). This includes changes in allergy profiles, disease states, visual acuity, and EEG, to name a few. MPD research implies that the body/mind is a fundamental indivisible unit. In engineering science, it is statistically well documented that the conscious intention of operators can apparently influence the outcome of sensitive electronic or mechanical devices such as random event generators and pseudorandom number computer programs (Jahn, Dunne, and Nelson 1987; Schmidt 1982). Remote perception, or the capability to ascertain information nonlocally, has been demonstrated (Puthoff and Targ 1976). Psychosomatic medicine and psychoneuroimmunology both show a distinct role of mind in health and disease (Ader 1983). Biofeedback, hypnosis, the placebo effect, and autogenic training indicate that profound effects upon physiology can be elicited by subtle mental shifts (Benson et al. 1974). Dozens of studies have shown that the prayers and meditations of widely separated individuals correlate with a significant improvement of the health and well-being of others (Byrd 1988). Numerous investigations in consciousness research suggest an inseparability of mind and body and a participatory role for mind interacting with matter that transcend the ordinary limitations of space-time.

Another area of particular importance to the Center is the newly emerging science of bioelectromagnetics—the study of natural and artificial electromagnetic fields (EMFs) and their relation to life and health. Recent evidence shows a much greater sensitivity of life forms, especially developing ones, to low-level nonionizing EMFs than had been predicted from

classical physics. Both positive and negative biological effects of such EMFs, ranging from extremely low frequency (ELF) to the radio and microwave regions, have been documented for many different life forms. Effects range from those at the molecular and cellular levels to tissue, organ, systemic, and behavioral changes (Becker 1975). Moreover, the well known phenomenon of dowsing may also be related to EMF effects. Research on dowsing suggests that the biological response in the form of a spontaneous twitch of a muscle, observed as a jerk of a rod held in the hand as one is moving over a geological gradient, is due to variations in extremely low intensity geophysical fields (Konig and Betz 1989). The biological effects of low intensity nonionizing EMFs, well below the threshold for thermal effects, are perplexing. In addition, the potential hazards of external ELF such as 60 and 50 Hz, the electric power frequencies in the U.S. and elsewhere, are the focal point of an increasing number of studies. Other frequencies now utilized in modern technology, such as communications and radar waves, may also be promoting little known and poorly understood biological effects. In relation to this, resonant microwave frequencies have been observed for cellular systems that stimulate growth and cell division with highly nonlinear dynamical responses (Grundier and Keilmann 1989). Apparently the natural geomagnetic field interacts with applied electromagnetic fields in eliciting certain biological effects (Adey 1984). In summary, the increasing evidence from the wide range of research in bioelectromagnetics suggests an intimacy of life with field interactions that is unbounded. It challenges the conventional discrete, biomolecular view of life in which living functions may be solely reduced to a complexity of biochemistry within the organism. Possibly living systems may even be regarded as fundamentally electromagnetic in their nature.

Complementary medical diagnostics and therapies that are modalities of subtle intervention comprise the third area that has captured the Center's attention. Some of these, such as acupuncture, homeopathy, and infinitesimal drug doses, and healer interventions, are older systems of medicine that remain largely incomprehensible in terms of the accepted biomedical model. Others, such as electroacupuncture and various other electromagnetic interventions, are relatively new. Collectively all of these have also been referred to as "energy medicine" or "soft medicine" and include electro-acupuncture, observed biological effects of extremely high dilutions (Davenas et al. 1988) and homeopathic preparations (Ferley et al. 1989; Reilly et al. 1986), a DC device with a small voltage to penetrate soft tissues and promote scarless regenerative healing (Becker 1990), therapeutic touch (Wirth 1989), and laying on of hands with intention to heal (Rubik 1992). Evidence is mounting from many different areas of research in complementary medicine that living systems are highly nonlinear and that subtle interventions in the form of very small stimuli can lead to significant beneficial effects without side effects. Such effects are unanticipated by the conventional medical model.

The paradigm-challenging facts cited here, taken collectively, seem to fit together somewhat like pieces of a puzzle and are beginning to give shape to the rudiments of a new scientific world view. One of the strategies of the Center is to draw connections between seemingly

disparate anomalies in these three areas toward building a larger framework, a new paradigm that would accommodate both conventional and frontier sciences. Although the universe is a seamless whole, conventional science has elaborated on smaller and smaller fragments without much regard for the whole picture. What is sorely missing is an interrelationship between the parts that comprise the whole. With its interdisciplinary scope and focus on the big questions, the Center attempts to contribute to the large-scale scientific picture to help restore a sense of wholeness.

The world is suffering from serious chronic problems—AIDS, increased cancer and other chronic degenerative disorders, over population, rampant hunger, endangered species, pollution, holes in the ozone layer, dwindling energy resources, and possible climatic changes. Creative breakthroughs to solve these problems are long overdue. What is needed is a dialogue between the frontier scientists who offer the possibility of new perspectives and those in the mainstream majority. The Center is committed to bridge-building from frontier to mainstream and to engendering new ways of seeing. In this way, solutions to larger human concerns may arise.

For example, scientists in the East and the West have been virtually isolated from one another for decades due to difficult political relations. The collapse of the Soviet Union has fostered an open exchange of information. Such informational exchange is of paramount importance in the frontier areas of science where cross-fertilization can give rise to new approaches and international collaborations.

The Center has hosted a number of events thus far that include international round table meetings with invited scientists and scholars on key topics within the scope of our three main frontier science areas of interest. It also hosts monthly colloquia or symposia at Temple University. Distinguished pioneers, including scientists of international reputation, are invited to speak and lead discussion. I have published several general-interest articles on the frontier sciences with a view to increasing the level of public comprehension of science in the U.S.

Scientists and scholars throughout the world who identify with frontier issues in science have become affiliated with the Center and form an extended global network of serious, open-minded scholars and researchers. Communications via mail, tele-fax, telex, bitnet, and telephone expand daily. The Center's semi annual journal, *Frontier Perspectives*, has a worldwide distribution of 5,000. More original contributed articles are being included to reflect the variety of opinions, divergent approaches, and splinter groups characteristic of the frontier sciences and to portray a good example of open system dynamics by incorporating a wide variety of viewpoints.

The three areas in which the Center is concentrating will have a significant impact on the future. The seemingly anomalous findings from each, taken collectively, point toward new

views of the cosmos, and especially of life, that encompass more features than the old. Life may now be seen as more dynamically responsive to subtle external influences, more interconnected, and more interdependent. Recent work on the origin and evolution of living systems shows that they evolve in unison with all of nature and exhibit a nonlinear interconnectedness. The role of consciousness moves from a position of insignificance in the dominant paradigm to one of active participation in both the biological and physical realms. Mind, nonlocal interactions, and electromagnetic field interactions may now be seen as critical to the functions of living systems. The new paradigm remains unfinished. The question also remains whether the new findings can be accommodated by science as we know it today. Some of the experimental results from consciousness research challenge our usual notions of objectivity and causality. New developments may pave the road toward a new postmodern science.

It has been said that one can recognize a pioneer by the arrows in his back. What will be the response to a collective group of scientists challenging mainstream ideas? Just as cooperative or coherent phenomena in nature have unusual strength and stability, frontier science researchers coming together gain a collectivestre ngth that is not easily dismissed. The Center for Frontier Sciences provides a unique opportunity for them to gather together with mutual support under a university umbrella and to join together in the challenges that await at the edge of science.

"The people who bind themselves to systems are those who are unable to encompass the whole truth and try to catch it by the tail; a system is like the tail of truth, but truth is like a lizard; it leaves its tail in your fingers and runs away knowing full well it will grow a new one..."

—Ivan Turgenev

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